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NATIONAL EUTROPHICATION SURVEY

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Report

on

CROSS LAKE

CADDO PARISH

LOUISIANA

EPA REGION VI

Working Paper No. 538

With the cooperation of the

Louisiana Wild Life and Fisheries Commission

and the

Louisiana National Guard

March, 1977

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16 ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT ON CROSS LAKE

CADDO PARISH, LOUISIANA

EPA REGION VI

by

National Eutrophication Survey

Water and Land Quality Branch
Monitoring Operations Division
Environmental Monitoring & Support Laboratory
Las Vegas, Nevada

and

Special Studies Branch
Corvallis Environmental Research Laboratory
Corvallis, Oregon

Working Paper No. 538

OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY

March 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control for professional involvement, to the Louisiana National Guard for conducting the tributary sampling phase of the Survey, and to those Louisiana wastewater treatment plant operators who provided effluent samples and flow data.

Robert A. Lafleur, Chief; J. Dale Givens, Assistant Chief; Lewis R. Still, Biologist; Louis Johnson, Biologist; Lee Caubarreaux, Biologist; Darrell Reed, Engineer; Dempsey Alford, Biologist; and Elwood Goodwin, Water Quality Control Technician, all of the Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper Series.

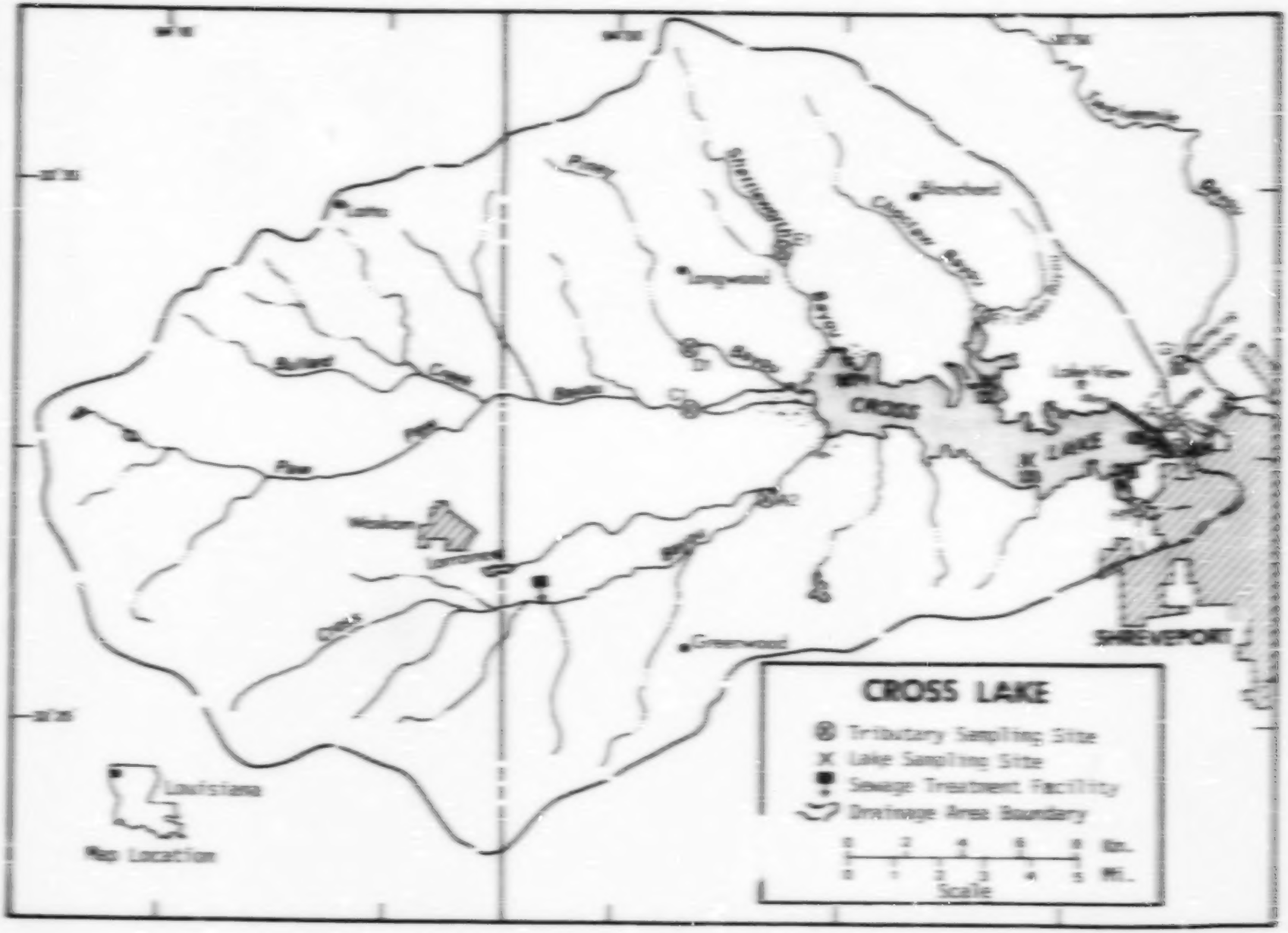
Major General O'Neil Daigle, Jr., the Adjutant General of Louisiana, and Project Officer Colonel Lawrence P. Dupre, who directed the volunteer efforts of the Louisiana National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF LOUISIANA

LAKE NAME	PARISH
Anacoco Lake	Vernon
Lake Bistineau	Bienville, Webster
Black Bayou	Caddo
Black Lake	Natchitoches and Red River
Bruin Lake	Tensas
Bundick Lake	Beauregard
Caddo Lake	Caddo (Menon and Harrison in Texas)
Cocodrie Lake	Concordia
Cocodrie Lake (Lower)	Rapides
Concordia Lake	Concordia
Cottile Lake	Rapides
Cross Lake	Caddo
D'Arbonne Lake	Union
False River Lake	Pointe Coupee
Indian Creek Reservoir	Rapides
Saline Lake	LaSalle
Turkey Creek Lake	Franklin
Lake Vernon	Vernon
Lake Verret	Assumption


CROSS LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Scale
Louisiana
Map Location
SHREVEPORT

REPORT ON CROSS LAKE, LOUISIANA
STORET NO. 2210

I. CONCLUSIONS

A. Trophic Condition:*

Survey data indicate that Cross Lake is eutrophic; i.e., nutrient rich and highly productive. Whether such nutrient enrichment is to be considered beneficial or deleterious is determined by its actual or potential impact upon designated beneficial water uses of the lake.

Chlorophyll a levels ranged from 8.7 µg/l in March to 73.8 µg/l in June with a mean of 38.4 µg/l. Potential for primary production as measured by algal assay control yield was high. Of the 19 Louisiana lakes studied in 1974, 10 had greater median total phosphorus, 12 had greater median dissolved orthophosphorus, and 14 had greater median inorganic nitrogen than Cross Lake.

Survey limnologists reported algal blooms in August and November. Ketelle and Uttormark (1971) state that Cross Lake had past problems with brine from oil field operations, but that this problem has been greatly curtailed.

*See Appendix E.

B. Rate-Limiting Nutrient:

Algal assay results indicate that Cross Lake was limited by available phosphorus levels during spring and autumn sampling. The addition of phosphorus alone or nitrogen and phosphorus simultaneously resulted in increases in assay yield. No growth response accompanied additions of nitrogen alone. Mean inorganic nitrogen to orthophosphorus (N/P) ratios for the lake data, however, were 13/1 or less on all four sampling occasions, suggesting nitrogen limitation.

C. Nutrient Controllability:

1. Point sources -

The mean annual phosphorus load from point sources was estimated to be approximately 14.6% of the total load reaching Cross Lake. The city of Waskom contributed this entire point source load.

The annual phosphorus loading of 0.34 g $P/m^2/yr$ for Cross Lake is less than Vollenweider's (1975) eutrophic level but greater than the oligotrophic level. However, loading for at least one of the ungaged tributaries of Cross Lake was probably underestimated (see Section IV-E). Any addition to the existing phosphorus loading of this lake should be carefully evaluated until a complete nutrient budget for the lake can be determined.

2. Nonpoint sources -

The phosphorus load from nonpoint sources was 85.4% of the total reaching the lake during the sampling year. Cross Bayou contributed 14.3%, Paw Paw Bayou contributed 28.4%, and the ungaged tributaries and immediate drainage were estimated to have contributed 27.2% of the nonpoint source phosphorus load. Loading calculations for Cross Lake yield a net export of nitrogen, indicating sampling and/or estimation procedures were not adequate to depict actual nitrogen loading and export rates.

Regardless of the primary nutrient limitation suggested by either algal assay or nutrient ratios, the most feasible approach to nutrient control, if desirable, is through available phosphorus control technology and subsequent establishment of phosphorus limitation within the water body.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

Lake and drainage basin characteristics are itemized below. Lake morphometry was provided by the State of Louisiana; tributary flow data were provided by the Louisiana District Office of the U.S. Geological Survey (USGS). Outlet drainage area includes the lake surface area. Mean hydraulic retention time was obtained by dividing the lake volume by mean flow of the outlet. Precipitation values are estimated by methods as outlined in National Eutrophication Survey (NES) Working Paper No. 175. A table of metric/English conversions is included as Appendix A.

A. Lake Morphometry:

1. Surface area: 35.77 km^2.
2. Mean depth: 2.7 meters.
3. Maximum depth: 3.3 meters.
4. Volume: 95.719 x 10^6 m^3.
5. Mean hydraulic retention time: 180 days.

B. Tributary and Outlet:
(See Appendix 5 for flow data)

1. Tributaries -

Name	Drainage area (km^2)	Mean flow ($m^3/sec.$)
A-2 Cross Bayou	132.9	0.99
C-1 Paw Paw Bayou	200.5	1.64
E-1 Shattuckworth Bayou	25.5	0.19
F-1 Logan Bayou	40.7	0.37
Minor tributaries and immediate drainage -	205.1	1.78
totals	620.7	4.87

2. Outlets -

A-1 Cross Bayou	655.3	4.86
B-1 Shreveport Municipal Water Supply Intake	0.0	1.30
totals	655.3	6.16

C. Precipitation:

1. Year of sampling: 150.1 cm.
2. Mean annual: 113.7 cm.

III. LAKE WATER QUALITY SUMMARY

Cross Lake was sampled four times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from five stations on the lake and from one or more depths at each station (see map, page v). During each visit, depth-integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the first and last visits, 18.9-liter depth-integrated samples were composited for algal assays. Maximum depths sampled were 1.5 meters at Station 01, 1.5 meters at Station 02, 3.0 meters at Station 03, 1.5 meters at Station 04, and 2.4 meters at Station 05. For a more detailed explanation of PLS methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix C and are summarized in III-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll a determinations are included in III-B. Results of the limiting nutrient study are presented in III-C.

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B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/23/74	1. Melosira	8,960
	2. Pennate diatom	1,063
	3. Microcystis	1,514
	4. Lunate cell	1,390
	5. Ankistrodesmus	1,165
	Other genera	5,415
	Total	19,915
06/03/74	1. Anabaenopsis	22,203
	2. Raphidiopsis	3,021
	3. Chroococcus	2,491
	4. Lyngbya	2,279
	5. Anabaena	1,749
	Other genera	11,829
	Total	43,572
08/26/74	1. Anabaenopsis	180,143
	2. Raphidiopsis	20,210
	3. Merismopedia	3,042
	4. Oscillatoria	2,817
	5. Flagellates	1,095
	Other genera	6,063
	Total	213,370
11/11/74	1. Dactylococcopsis	4,500
	2. Ankistrodesmus	4,236
	3. Microcystis	3,091
	4. Chroococcus	2,445
	5. Merismopedia	1,007
	Other genera	5,500
	Total	20,815

7. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/23/74	01	8.7
	02	14.5
	03	14.5
	04	14.0
	05	10.7
06/03/74	01	69.0
	02	73.0
	03	73.0
	04	62.2
	05	58.6
08/26/74	01	55.5
	02	39.2
	03	59.4
	04	69.2
	05	56.8
11/11/74	01	14.8
	02	19.0
	03	15.1
	04	18.8
	05	19.0

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. 03/23/74 - Stations 01-05

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.007	0.165	1.0
0.05 P	0.057	0.165	4.6
0.05 P + 1.0 N	0.057	1.165	16.8
1.00 N	0.007	1.165	0.9

b. 11/11/74 - Stations 01-03

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.012	0.055	2.2
0.05 P	0.062	0.055	5.1
0.05 P + 1.0 N	0.062	1.055	19.0
1.00 N	0.012	1.055	2.4

c. 11/11/74 - Stations 04-05

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.021	0.113	4.1
0.05 P	0.071	0.113	5.4
0.05 P + 1.0 N	0.071	1.113	17.8
1.00 N	0.021	1.113	5.2

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential for primary production in Cross Lake was moderately high during spring and high at the time of autumn assay sample collection. During autumn, the potential for primary production was higher for lake

Stations 04 and 05 than for Stations 01 to 03. This is possibly due to the proximity of Stations 04 and 05 to the discharge of tributary A-1, Unnamed Stream, which flows through Shreveport.

In all assays, growth response with the addition of phosphorus as well as the lack of response to the addition of nitrogen indicates phosphorus limitation. Maximum growth yield was achieved with the simultaneous addition of both phosphorus and nitrogen.

The mean N/P ratios for Cross Lake were 13/1 or less in all four sampling occasions suggesting nitrogen limitation in the lake (a mean N/P of 14/1 or more is considered indicative of phosphorus limitation).

It should be noted that significant chemical changes took place in Louisiana lake samples between collection and algal assay. The assay data should be considered in this context and until such differences are resolved, used with caution for any prediction of actual lake conditions. Such chemical changes are likely to alter the assay control yield as well as modify the N/P ratio.

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Louisiana National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of June and February when two samples were collected. Sampling was begun in June 1974, and was completed in May 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Louisiana District Office of the USGS for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a USGS computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of USGS) were estimated by using the mean annual nutrient loads, in $kg/km^2/yr$, in Paw Paw Bayou, Shettleworth Bayou, and Logan Bayou at Stations C-1, E-1, and F-1, and multiplying the means by the ZZ area in km^2.

The operator of the Waskom wastewater treatment plant provided monthly effluent samples and corresponding flow data.

A. Waste Sources:

1. Known municipal -

Name	Population Served*	Treatment*	Mean Flow ($m^3/d \times 10^3$)	Receiving Water*
Waskom	1,460	Imhoff tank	0.659	Cross Bayou

2. Known industrial - None

*Treatment plant questionnaire.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 Cross Bayou	1,730	14.3
C-1 Paw Paw Bayou	3,186	26.4
E-1 Shattleworth Bayou	255	2.1
F-1 Logan Bayou	1,125	9.3
b. Minor tributaries and immediate drainage (nonpoint load) -	3,280	27.2
c. Known municipal STP's -		
Waskom	1,770	14.6
d. Septic tanks* -	105	0.9
e. Known industrial - None		
f. Direct precipitation** -	625	5.2
Totals	12,075	100.0

2. Outputs -

A-1 Cross Bayou	10,060
B-1 Shreveport Municipal Water Supply Intake	1,905
Total	11,965

3. Net annual P accumulation - 110

*Estimate based on 363 lakeside residences and 1 park.
**Estimated (see NES Working Paper No. 175).

C. Annual total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (nonpoint load) -		
A-4 Cross Bayou	22,320	13.5
C-1 Paw Paw Bayou	38,130	23.0
F-1 Shattleworth Bayou	4,540	2.7
F-1 Logan Bayou	11,700	7.0
b. Minor tributaries and immediate drainage (nonpoint load) -	41,025	24.7
c. Known municipal STP's -		
Waskom	5,670	3.4
d. Septic tanks* -	3,905	2.4
e. Known industrial - None		
f. Direct precipitation** -	38,615	23.3
Totals	165,950	100.0

2. Outputs -

A-1 Cross Bayou	131,460
B-1 Shreveport Municipal Water Supply Intake	36,320
Total	167,780

3. Net annual P export*** - 1,830

*Estimate based on 163 lakeside residences and 1 park.
**Estimated (see NES Working Paper No. 175).
***Export probably due to unknown sources and/or sampling error.

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Cross Bayou	13	168
Paw Paw Bayou	15	183
Shettleworth Bayou	16	178
Logan Bayou	23	240

E. Mean Nutrient Concentration in Ungaged Streams:

Tributary	Mean Total P (mg/l)	Mean Total N (mg/l)
D-1 Piney Bayou	0.068	0.944
G-1 Aqueduct from Twelvemile Bayou	0.125	0.869
H-1 Unnamed Stream	0.333	1.580

Nutrient levels in tributaries D-1 (Piney Bayou) and G-1 (Aqueduct Bayou) are roughly in line with the other gaged tributaries entering Cross Lake. However, levels for H-1 (Unnamed Stream) were substantially higher. This is probably attributable to the fact that Unnamed Stream runs through the western residential section of Shreveport.

f. Yearly Loadings:

In the following table, the existing phosphorus annual loading is compared to the relationship proposed by Vollenweider (1975). Essentially, his "eutrophic" loading is that at which the receiving waters would become eutrophic or remain eutrophic; his "oligotrophic" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A "mesotrophic" loading would be considered one between "eutrophic" and "oligotrophic".

Note that Vollenweider's model may not apply to lakes with short hydraulic retention times or in which light penetration is severely restricted by high concentrations of suspended solids in the surface waters.

	Total Yearly Phosphorus Loading ($g/m^2/yr$)
Estimated loading for Cross Lake	0.34
Vollenweider's "eutrophic" loading	0.46
Vollenweider's "oligotrophic" loading	0.23

V. LITERATURE REVIEWED

Ketelle, Martha J. and Paul O. Uttormark. 1971. Problem Lakes in the United States. U.S. Environmental Protection Agency Project #16010 EHR. University of Wisconsin, Madison, Wisconsin.

U.S. Environmental Protection Agency. 1975. National Eutrophication Survey Methods 1973-1976. Working Paper No. 175. National Environmental Research Center, Las Vegas, Nevada, and Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon.

Vollenweider, R. A. 1975. Input-Output Models With Special Reference to the Phosphorus Loading Concept in Limnology. Schweiz. Z. Hydrol. 37:53-84.

APPENDIX A
CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

TRIBUTARY FLOW DATA

[illegible]

APPENDIX C

PHYSICAL AND CHEMICAL DATA

[illegible]

[illegible]

[illegible]

APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

[illegible]

[illegible]

DATE	TIME	DEPTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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APPENDIX E

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1974

STATE OF LOUISIANA

LAKE DATA TO BE USED IN RANKING

LAKE CODE	LAKE NAME	[illegible] TOTAL P	[illegible] INORG N	[illegible] 40 m SEC	[illegible] CHLOR	[illegible] 40% DO	[illegible] ZOOS BIOMASS P
2201	[illegible] LAKE	0.131	0.360	485,833	0.700	10,407	0.007
2202	SOUTH LAKE	0.057	0.750	456,333	10.250	15,000	0.117
2203	LAKE HUTTONEN	1.961	0.133	458,091	12.431	13,291	0.019
2204	BLACK BAYOU	0.946	0.290	453,417	17.819	12,500	0.076
2205	[illegible] LAKE	0.157	0.135	485,667	20.467	10,490	0.073
2207	THOMPSON LAKE	0.468	0.400	470,000	35.389	7,700	0.025
2208	CATTLE LAKE	0.037	0.130	442,333	12.650	14,000	0.011
2209	CONCORDIA LAKE	0.176	0.060	465,333	32.010	14,000	0.009
2210	CROSS LAKE	0.057	0.060	475,250	38.385	11,409	0.010
2211	SHARROWE LAKE	0.016	0.100	456,250	0.000	13,700	0.011
2212	FALSE ROSES LAKE	0.092	0.130	442,500	24.756	14,900	0.023
2213	INDIAN CREEK	0.031	0.250	458,333	21.467	14,405	0.012
2214	SALINE LAKE	0.111	0.250	483,188	15.333	6,699	0.005
2215	TURKEY CREEK LAKE	0.170	0.170	477,833	21.967	14,649	0.033
2216	LAKE [illegible]	0.163	0.199	481,425	62.824	12,000	0.046
2217	LAKE [illegible]	0.019	0.329	476,667	4.481	14,459	0.007
2218	BLACK LAKE	0.077	0.250	474,000	12.733	11,600	0.015
2221	[illegible]	0.109	0.250	478,333	33.431	11,691	0.014
4407	[illegible] LAKE	0.240	0.270	483,562	25.125	10,000	0.000

[illegible] OF LAKES WITH MISSING VALUES [illegible] OF LAKES WITH CHANGED VALUES

LAKE CODE	LAKE NAME	[illegible] TOTAL P	[illegible] INORG N	[illegible] SEC	[illegible] CHLOHYL	[illegible]	[illegible]
2001	[illegible] LAKE	42 : 140	43 : 144	47 : 157	68 : 227	43 : 143	94 : 313
2002	[illegible] LAKE	61 : 111	11 : 21	69 : 251	61 : 111	0 : 0	51 : 93
2003	LAKE [illegible]	54 : 94	50 : 94	61 : 111	72 : 131	42 : 71	33 : 61
2004	[illegible] [illegible]	12 : 134	72 : 131	79 : 144	54 : 101	50 : 91	91 : 144
2005	[illegible] LAKE	11 : 21	33 : 61	33 : 61	44 : 81	79 : 144	0 : 0
2007	[illegible] LAKE	29 : 51	0 : 0	11 : 21	11 : 21	100 : 181	17 : 31
2008	[illegible] LAKE	43 : 151	11 : 41	94 : 171	63 : 114	33 : 61	91 : 111
2009	[illegible] LAKE	44 : 81	63 : 144	39 : 71	22 : 41	14 : 21	41 : 144
2011	[illegible] LAKE	54 : 101	43 : 144	29 : 51	0 : 11	71 : 131	44 : 121
2011	[illegible] LAKE	79 : 144	59 : 91	94 : 101	94 : 171	42 : 71	54 : 111
2012	[illegible] [illegible] LAKE	11 : 41	21 : 71	49 : 141	21 : 51	0 : 11	71 : 91
2013	[illegible] [illegible]	42 : 141	21 : 51	11 : 41	21 : 71	14 : 21	44 : 121
2014	[illegible] LAKE	17 : 31	4 : 11	1 : 41	47 : 121	94 : 171	21 : 41
2015	[illegible] [illegible] LAKE	0 : 41	17 : 31	21 : 41	11 : 41	21 : 41	11 : 21
2016	LAKE [illegible]	0 : 11	59 : 91	0 : 11	1 : 11	54 : 101	0 : 11
2017	LAKE [illegible]	101 : 101	44 : 41	101 : 101	101 : 101	21 : 51	101 : 101
2014	[illegible] LAKE	31 : 71	21 : 41	71 : 114	71 : 141	47 : 121	31 : 71
2011	[illegible]	21 : 41	101 : 101	17 : 31	17 : 31	41 : 111	44 : 11
4017	[illegible] LAKE	47 : 121	94 : 171	44 : 41	51 : 41	41 : 141	41 : 141